

## **REMARKS**

This amendment is in response to the Office Action mailed January 28, 2008. Claims 1-9 were rejected. The claims have been amended to address the concerns raised by the Examiner.

Claims 1-9 were originally presented. Claims 1-9 remain in the application. Claims 1 and 4-8 have been amended. Claims 10 and 11 have been added. Support for the amendments and new claims 10 and 11 is found in the specification and original claims. No new matter has been added.

### **Claim Rejections - 35 U.S.C. § 112**

Claim 6 stands rejected under § 112, second paragraph, as being a method of using claim dependent on apparatus claims 1-5. Accordingly, claim 6 has been amended to be an apparatus claims dependent on claim 1. Therefore, Applicant requests the rejection be withdrawn.

Claim 1-9 stand rejected under § 112, 2nd paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the office action asserts the term “especially” is vague and indefinite and should not be used in claim language. Accordingly, the term “especially” has been deleted from the claims. Therefore, Applicant requests the rejections be withdrawn.

### **Claim Rejections - 35 U.S.C. § 102**

Claims 1-9 (including independent claim 1) were rejected under 35 U.S.C. § 102(b) as being anticipated by McEwen (US 3,516,248).

The McEwen reference fails to disclose a steam cycle with a steam generator using a water-based operating medium.

Instead, McEwen discloses a Rankine cycle using certain sulfur-free, non-halogenated organic compounds. Pyridine and Pyrrole are specifically disclosed as a working medium. Additionally, McEwen refers to low temperature ORC fluids that are particularly advantageous for recovering and converting heat energy to mechanical energy from relatively low level heat sources (Column 3, line 3-5). Thus, the disclosure of McEwen provides for working media which are suitable to replace water in a Rankine cycle rather than be added to water in a steam cycle.

In Contrast, independent claim 1 sets forth:

“Steam cycle with a steam generator, adapted to have thermal energy transferred to a water-based operating medium... characterized in that the operating medium additionally contains at least one heterocyclic compound” (emphasis added).

The elements of a water-based operating medium containing at least one heterocyclic compound are not taught in any of the cited references, and provide the advantage being usable in steam cycles which are naturally operated at very high temperatures.

Therefore, Applicant respectfully submits that independent claim 1 is allowable, and urges the Examiner to withdraw the rejection. Claims 2-9 are allowable for at least their dependence on an allowable independent claim.

Claims 1-2 (including independent claim 1) were rejected under 35 U.S.C. § 102(b) as being anticipated by Yogev et al (US 4,760,705).

The Yogev reference also fails to disclose a steam cycle with a steam generator using a water-based operating medium.

Instead, Yogev discloses a Rankine cycle with a working fluid consisting of aromatic hydrocarbons. Yogev specifically discloses that only low grade heat sources, such as waste heat, geothermal heat and solar heat are used (Column 1 lines 61-63). Therefore, the Rankine cycle in Yogev also operates at considerably lower temperatures (300-400°C, see Column 2, line 65) than the steam cycle (typically 550°C). Yogev has not recognized that the addition of heterocyclic compounds as opposed to ordinary cyclic hydrocarbons will lead to an improved performance of a steam cycle due to their improved operability with water at high temperatures.

The elements of a water-based operating medium containing at least one heterocyclic compound are not taught in any of the cited references, and provide the advantage being usable in steam cycles which are naturally operated at very high temperatures.

Therefore, Applicant respectfully submits that independent claim 1 is allowable, and urges the Examiner to withdraw the rejection. Claim 2 is allowable for at least their dependence on an allowable independent claim.

Claims 1-3, and 9 (including independent claim 1) were rejected under 35 U.S.C. § 102(b) as being anticipated by Zimron et al (US 6,018,252).

The Zimron reference also fails to disclose a steam cycle with a steam generator using a water-based operating medium.

Instead, Zimron discloses an organic Rankine cycle power plant using an organic working fluid such as pentane or isopentane (Column 1, line 33-34). Such hydrocarbons are thermally unstable at high temperatures which are necessary to operate a steam cycle. Working fluids used in ORCs as they are mentioned as prior art in the introductory part of the present application, are, therefore, not well suitable for the use at high temperature steam cycles. Furthermore, organic Rankine cycles explicitly do not use steam because the boiling point of water is too high for such cycles. ORCs are specifically designed to use low temperature heat sources. The reason to use organic compounds is not their potentially lower freezing point but their lower boiling point. As organic compounds used in ORCs are thermally unstable they are explicitly excluded from the use in steam cycles which are naturally operated at very high temperatures. Thus, Zimron does not describe the use of a steam cycle as it is claimed in the claims.

The elements of a water-based operating medium containing at least one heterocyclic compound are not taught in any of the cited references, and provide the advantage being usable in steam cycles which are naturally operated at very high temperatures.

Therefore, Applicant respectfully submits that independent claim 1 is allowable, and urges the Examiner to withdraw the rejection. Claims 2-3 and 9 are allowable for at least their dependence on an allowable independent claim.

### **Claim Rejections - 35 U.S.C. § 103**

Claims 4-8 were rejected under 35 U.S.C. § 103 as being unpatentable over Zimron et al. in view of Tincher et al (US 4,342,658).

The Zimron and Tincher references, when combined, do not teach or suggest all of the elements of independent claim 1. Specifically, as noted above, the Zimron reference does not teach a steam cycle for a steam generator including a water-based operating medium containing at least one heterocyclic compound, and the Tincher reference does not overcome that deficiency.

Instead, Tincher teaches the use of a water-based hydraulic fluid containing 2-methyl-pyridine. This fluid, however, is disclosed for the use as a hydraulic fluid or metalworking lubricant. It is not disclosed for its use as a working medium in steam cycles.

Moreover, combining Tincher with Zimron is improper because Zimron teaches ORCs which are specifically designed not to use water while the hydraulic fluid of Tincher is water-based. Due to its thermodynamic properties the fluid disclosed by Tincher is not suitable for the low temperature Rankine cycle of Zimron. Furthermore, Tincher has not recognized that the addition of, for example, 2-methyl-pyridine will lead to lower freezing point, and yet provide sufficient thermal stability.

However, even if such a hydraulic fluid was used as a working medium in the Rankine cycle of Zimron, the result would still not be a steam cycle as claimed in the present application because such a steam cycle is operated at much higher temperatures of typically 550°C than the ORC-systems disclosed in any of the cited references which are operated at much lower temperatures of up to 400 °C.

Therefore, Applicant respectfully submits that claims 4-8 are allowable, and urges the Examiner to withdraw the rejection.

### CONCLUSION

In light of the above, Applicant respectfully submits that pending claims 1-11 are now in condition for allowance. Therefore, Applicant requests that the rejections and objections be withdrawn, and that the claims be allowed and passed to issue. If any impediment to the allowance of these claims remains after entry of this Amendment, the Examiner is strongly encouraged to call Robert L. Lundstrom or Robert R. Mallinckrodt at (801) 566-6633 so that such matters may be resolved as expeditiously as possible.

Two claims were added (claims 10-11), including one independent claim (claims 11). Only one independent claim was originally filed, therefore, no additional fee is due.

The Commissioner is hereby authorized to charge any additional fee or to credit any overpayment in connection with this Amendment to Deposit Account No. 20-0100.

DATED this 28<sup>th</sup> day of April, 2008.

Respectfully submitted,



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